Third United Nations International Conference on the Peaceful Uses of Atomic Energy

A/CONF.28/A/762
GERMANY, FEDERAL REPUBLIC OF
February 1964
Original: ENGLISH

Confidential until official release during Conference

Abstract

On the Experimental Region Connecting Diffusion Length and Pulsed Neutron Experiments

by

K.H. Joest, G. Memmert
Interatom, Internationale Atomreaktorbau GmbH

According to a remark of H.C. Honeck there is a gap between the area of pulsed neutron measurements and stationary diffusion length measurements, if they are described in the plane of $\lambda - v\Sigma_A$ vs. B^2. This is due to the fact that there is no absorption possible which is smaller than that of the moderator itself. If one considers the possibility of exponential experiments with sources rising with time or falling not faster than $\exp - v\Sigma_A \cdot t$ full analogy between the B^2 and $\varkappa = - B^2$ region can be established without any gap.

The exponential time variation of the flux impressed by the time variation of the source is physically equivalent to a change in the absorption of the system. Especially the decaying state corresponds to a depoisoning so that states with effective absorption smaller than $v\Sigma_A$ can be realized, which are impossible in the stationary diffusion length measurements. The increase in poisoning could be simulated by sources increasing exponentially in time. If an exponential source could be realized experimentally with sufficient accuracy, such experiments may be faster and cheaper than the stationary poison variation experiments.

The theory of asymptotic states of the form $\exp - \{\lambda t - \varkappa z\}$ has been treated for the monoenergetic and the energy dependent Boltzmann equation. The states $\exp - \{\lambda t + iBz\}$, corresponding to pulsed experiments in finite media, have been included in the analysis in order to show the strong relations between the two types of asymptotic theories.